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SCIENCE 7

STUDENT SUPPORT GUIDE

INTRODUCTION AND MODULE 1:
CHARACTERISTICS OF LIVING THINGS

Distance Learning

Alberta EDUCATION

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Science 7

Module 1

STUDENT SUPPORT GUIDE

ACKNOWLEDGEMENTS

This module has been based on **Science Directions 7** by John Wiley & Sons/Arnold Publishing Ltd., 1989. Program consultant was Douglas A. Roberts. The author team for the complete text included: Wilson C. Durward, Eric S. Grace, Gene Krupa, Mary Krupa, Alan J. Hirsch, David A.E. Spalding, Bradley J. Baker, Sandy M. Wohl. Contributing author was Jean Bullard. Portions of **Science Directions 7** have been used throughout and have been adapted in a variety of ways.

Cover photographs courtesy of Dave Mussell, Edmonton.

Note to the Parent or Guardian

This Science Student Support Guide contains answers to activities in the accompanying Module Booklet. It should be kept secure by the parent or guardian if the student is under 16 years of age. Younger students should not have access to this Guide except under supervision.

This Student Support Guide does not contain the answers to the accompanying Assignment Booklet. The Assignment Booklet will be graded by the student's distance education teacher.

Science 7
Student Support Guide
Module 1
Characteristics of Living Things
Alberta Distance Learning Centre
ISBN No. 0-7741-0125-3

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MODULE 1 - ACTIVITIES AND ANSWERS

STUDENT QUESTIONNAIRE FOR SCIENCE 7

FOREWORD

Welcome to distance learning. You have chosen an alternate form of learning that allows your student greater freedom in some ways than traditional classroom learning. It also requires discipline and motivation for your student to carry on without someone standing behind and pushing as a classroom teacher often does. For junior high students distance learning is generally more effective if there is a learning facilitator. A parent or guardian of a student studying at home can be this person. As the learning facilitator, you will have to help motivate and discipline your distance learning student.

This guide has been developed to assist you. It begins by familiarizing you with the process of learning at a distance. You will learn what is expected of a learning facilitator, how the course is set up, and how to help your student complete the course successfully. The remainder of this guide and all other guides (there is one for every module) contain guidance and answers to the activities your student is expected to do. Begin by reading the introductory material in this guide.

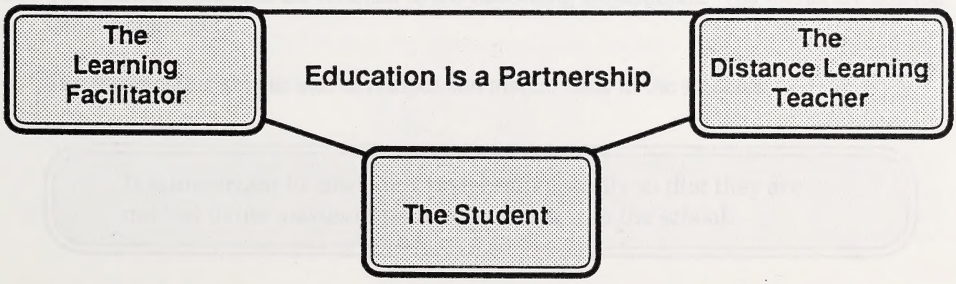
DISTANCE LEARNING

The Role of the Learning Facilitator

As the learning facilitator, you have a key role in determining the success your student has taking this course. Students need encouragement and the confidence of knowing that the course is important to their future.

You are expected to perform the following duties:

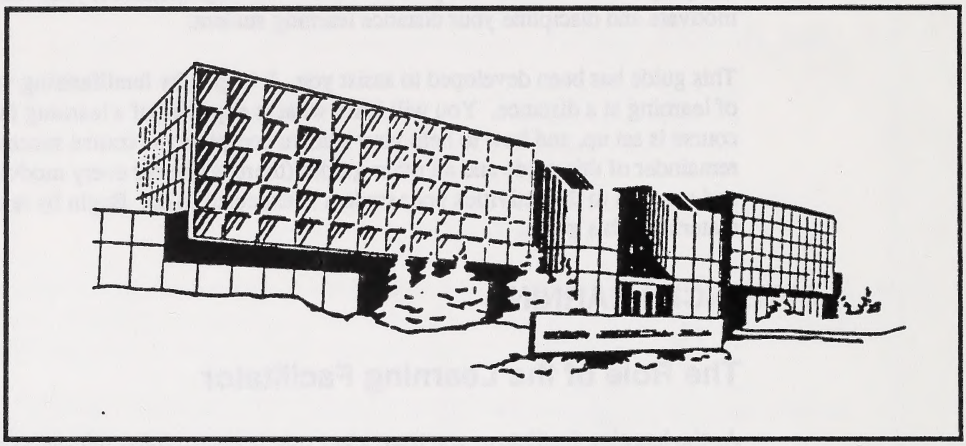
- Be the contact person with the Alberta Distance Learning Centre.
- Ensure the student has a suitable study area.
- Ensure the safe handling of media.
- Ensure that science experiments are done in a safe manner.
- Ensure the student establishes a timetable.
- Supervise the student's completion of modules.
- Monitor the student's progress.
- Provide the student with encouragement.
- Check the student's work, or supervise the student's checking of the activities.
- Supervise the submission of assignments.



The Alberta Distance Learning Centre

The Alberta Distance Learning Centre helps those who want to learn at a distance.

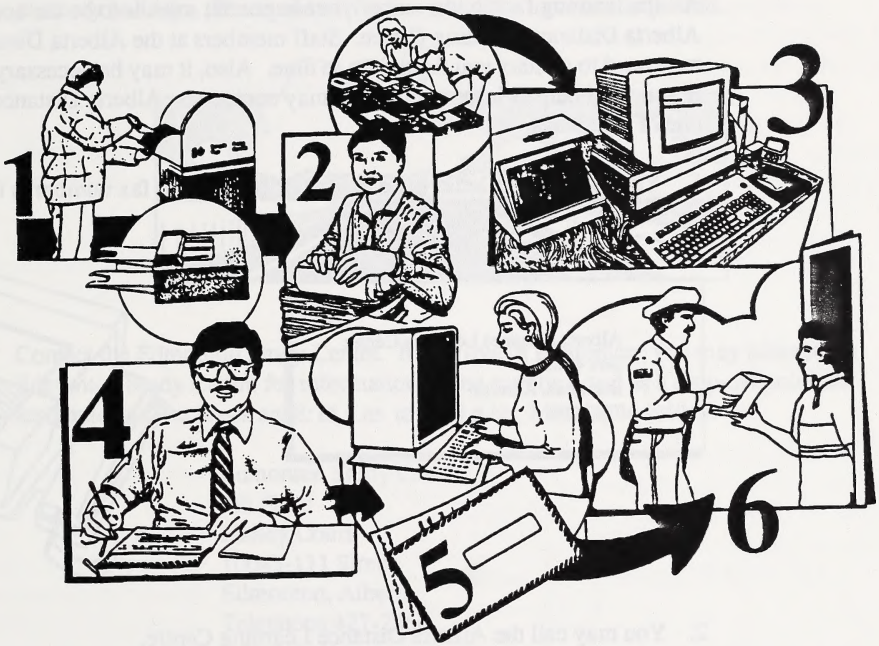
The Alberta Distance Learning Centre



The Alberta Distance Learning Centre is a branch of Alberta Education. It helps educate approximately 40 000 students a year from all parts of Alberta, the rest of Canada, and all over the world. Not all of these students study on their own. Some students use distance learning courses to work at their own pace but work in schools or institutions under the guidance of a learning facilitator. The Alberta Distance Learning Centre provides materials for grades 1 to 9, for the core subjects in high school, and for many option courses. All courses follow Alberta curriculum guidelines.

The building, located in Barrhead, Alberta, is about 6 500 m^2. Barrhead is located 120 km northwest of Edmonton. It contains a modern printing and typography unit, an instructional design unit, a teaching unit, a shipping and mailing unit with its own postal code, and a student services unit. The staff numbers about 200. Some teaching staff work in their homes on a contract basis.

How the Assignments Are Processed



1. Your student's assignments are received at the Mailing Department and sent to the Recording Department.

2. At the Recording Department materials are separated and labels are checked to see that they are correct. Assignments are sorted into elementary, junior high, and senior high subject areas.

3. All assignments and tests are entered into the computer.

4. Depending on the teacher to whom the student is assigned, the student's assignments come to the in-house teachers at the Alberta Distance Learning Centre or go to the contract teachers who work at home.

5. Corrected assignments are returned to the Recording Department. The marks are entered into the computer.

6. The assignments are put into envelopes and mailed back to the students.

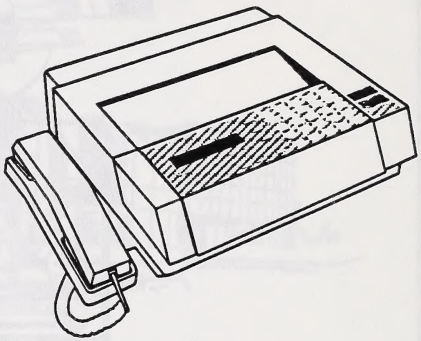
It is important to label your materials carefully so that they are not lost in the masses of paper that are sent to the school.

How to Make Contact

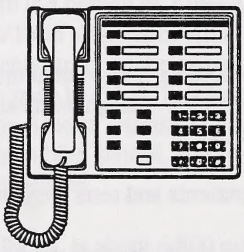
As the learning facilitator, one of your important roles is to be the contact person with the Alberta Distance Learning Centre. Staff members at the Alberta Distance Learning Centre may need to contact you from time to time. Also, it may be necessary for you to contact us. If you need help or information, you may contact the Alberta Distance Learning Centre in one of four ways.

1. You may write a letter to be mailed or faxed. The fax number is 674-6588.

Alberta Distance Learning Centre
Box 4000
Barrhead, Alberta
T0G 2P0

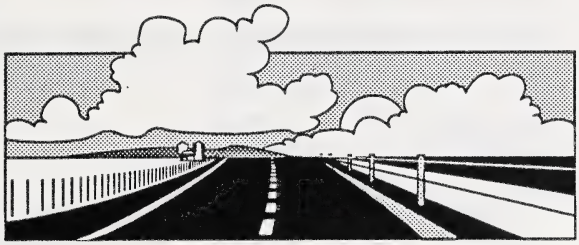


2. You may call the Alberta Distance Learning Centre.



- If you live in the Barrhead area, call 674-5333.
- If you live in other parts of Alberta, you may phone using the Government RITE System. Dial the number of the RITE Operator under your local Government of Alberta listings and ask for the Alberta Distance Learning Centre (674-5333).
- If you live in an area of Alberta not serviced by the RITE Sytem, simply dial "0" and ask for "ZENITH 22333"; then ask for the Alberta Distance Learning Centre.

3. Come to visit the Alberta Distance Learning Centre in Barrhead (120 km northwest of Edmonton). Office hours are 8:15 a.m. to 4:30 p.m., Monday to Friday, except on statutory holidays. Phone ahead if you wish to see a particular person.



4. Contact the Edmonton Study Centre. If you live in Edmonton, you may contact the Edmonton Study Centre for information, some supplies, and as a drop-off point for assignments. The hours are 8:15 a.m. to 4:30 p.m., Monday to Friday.

Edmonton Study Centre
9th Floor
Harley Court
10045-111 Street
Edmonton, Alberta
Telephone 427-2766

When you are concerned about course content, ask for a specific teacher or a particular department. When you are concerned about registrations, testing, or accounts, ask for Student Services.

Student

Student

Teacher

Student Services

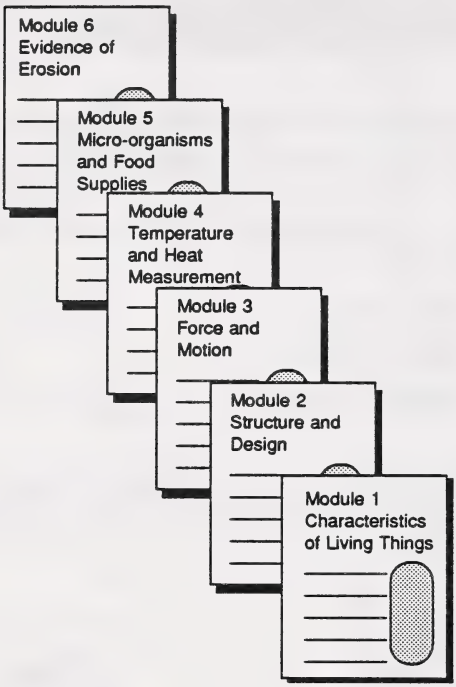
Registrations

ALL ABOUT SCIENCE 7

How the Course Is Designed

This new learning package involves many other components in addition to the student support guide.

Modules

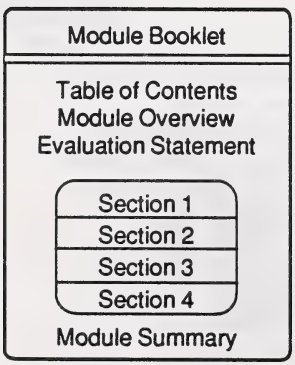


The print components involve booklets called modules.

The structure of the modules in Science 7 follows a systematic design. Each module begins with a table of contents, a module overview, and an evaluation statement.

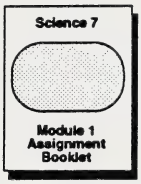
The body of the module is made up of closely related sections. The number of sections will vary from module to module, but each section contains student activities that develop strategies, knowledge, and skills centred around a theme.

At times the student and the learning facilitator are allowed to choose the activity that best suits the student's needs and interests. Other activities are optional. This flexibility caters to each student's personal situation.



The module summary focuses on the main ideas that the student has learned. This is an important part of the module because it discusses how all the ideas in the sections are related.

Assignment Booklets



Accompanying each module is an assignment booklet. The student's mark for each module will be determined by how well they do the assignments in the assignment booklet. If they are having difficulties, they should go back and review the appropriate section in the module booklet. Students are directed to the assignment booklet while working through the module booklet. The assignments usually follow several activities in the module booklet.

There are a number of assignments in the assignment booklet. The total of these assignments is 100 marks.

When the student has completed the assignment booklet, it should be promptly mailed for corrections to the Alberta Distance Learning Centre. While you are waiting for feedback from the teacher, you are encouraged to have the student start the next module.

Media

The learning package also includes reference to media. Pathways have been developed so students can use a variety of media to learn what is important. These different routes have been included to suit different learners. Wherever videos have been included, a print pathway is also available. This way, if the media isn't available or desired, a student can follow the print pathway and still successfully complete the course.

VIDEOCASSETTE

COURSE AUDIOCASSETTE PROVIDING GENERAL TEACHER GUIDANCE

A special audiocassette features a teacher guiding the student through the course. The appearance of the teacher icon reminds students that there is this additional help available.

A DESCRIPTION OF SCIENCE 7

Aims of the Science 7 course

The Science 7 course aims to develop the following:

- a basic foundation of scientific knowledge
- an understanding of how scientific knowledge is gathered
- an understanding of how scientific knowledge is used to solve practical problems
- an awareness of how science and technology affect the individual and society
- an ongoing interest in science

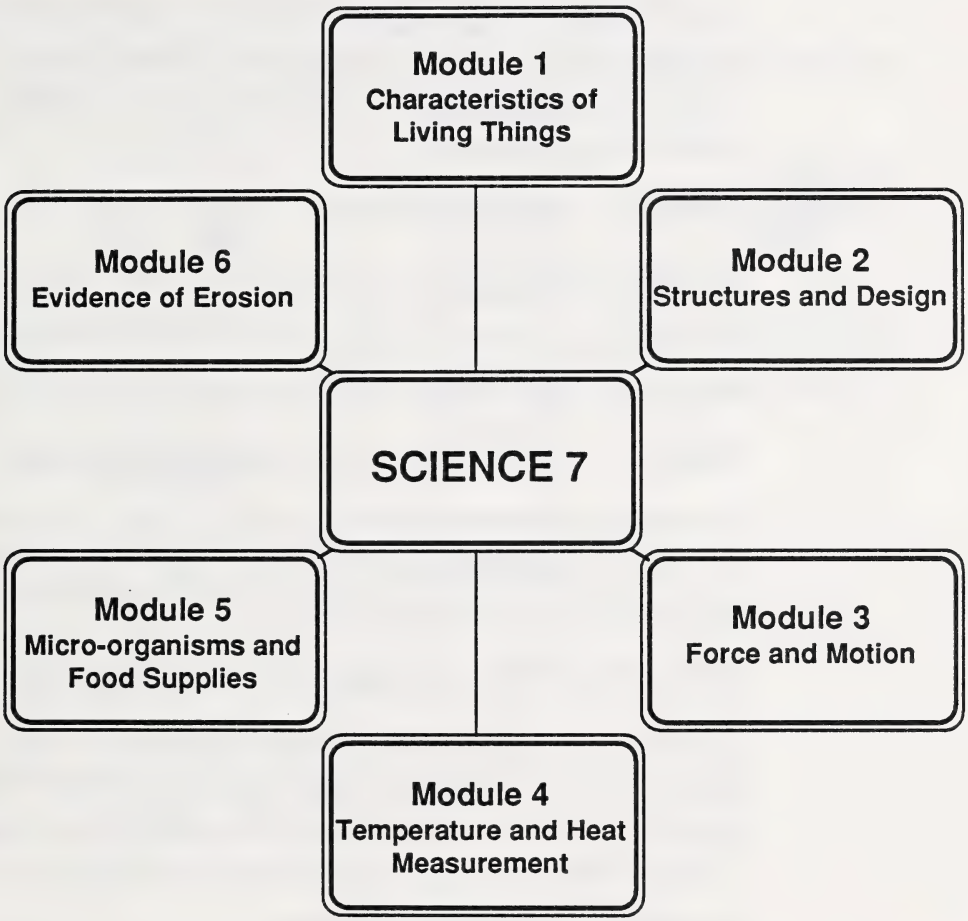
Course Structure

Science 7 consists of six modules. Topics of study include life science, earth science, and physical science. The concepts are introduced through a broad range of experiences – including those based on first-hand experience. Students will need to work closely with a parent or guardian for guidance and for the correction of the activities within each module.

Three important aspects of science education are stressed in Science 7. Each module focuses on one of these three major areas of emphases to develop the topics within the module. However, each module also supports learning with the other two emphases. The three major areas of emphases are

- **The Nature of Science** (S) – the process by which scientific knowledge is gathered
- **Science and Technology** (ST) – the application of science to the solution of practical problems
- **Science, Technology, and Society** (STS) – the effect of science and technology on society

The six modules that make up the Science 7 course are as follows:



Module 1: Characteristics of Living Things

The major emphasis of this module is on the nature of science. Students will examine ways to distinguish between living and non-living things. They will investigate features such as growth patterns, how living things respond to changes around them, and how living things are adapted to survive. Like scientists, students will use their observation and interpretation skills to increase their knowledge of living things.

Module 2: Structures and Design

The major emphasis of this module is on science and technology. Students will be looking closely at structures and at the way they are put together. They will compare structures such as buildings, bridges, and furniture, with structures that exist in the natural world. Students will have the opportunity to plan and build some structures on their own. They will discover how to choose the best materials for making the structures, and they will discover why one design is stronger than another.

Module 3: Force and Motion

The major emphasis of this module is on the nature of science. This module provides students the opportunity to study a variety of forces and to examine the effects of those forces on objects and materials. Students will learn to recognize and measure forces, then focus on the effects of those forces within different systems and in different applications. A study of the causes and effects of friction, and a study of motion in space are also part of this module.

Module 4: Temperatures and Heat Measurement

The major emphasis of this module is on the nature of science. This module examines the effects of heat and temperature changes with particular attention to methods of measuring these. The uses of different sources of heat are considered, and comparisons of the heat energy in various fuels and food are made.

Module 5: Micro-organisms and Food Supplies

The major emphasis of this module is on science, technology, and society. Students will learn about health problems that result from improper food preparation and handling, what micro-organisms are and where they live, how micro-organisms affect our food, how our food can be kept safe from micro-organisms, and how society makes decisions about safe handling of food.

Module 6: Evidence of Erosion

The major evidence of this module is on the nature of science. This module examines changes in the surface of the earth, which result from the erosion, transport, and deposition of earth materials. Students will learn how even the hardest rocks are slowly broken down into smaller pieces, and how these pieces are moved by wind, water, and ice. They will make inferences about how the landscape has changed over time.

Symbols and Terms Used in This Course

Symbols

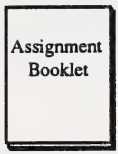
Science 7 has a number of symbols in the margins. These symbols are used throughout the course.

Videocassette

Textbook

Course Audiocassette providing general teacher guidance

Read



Assignment Booklet

Be sure that you and the students become familiar with these symbols.

Terms

When new terms or concepts are introduced in the course, it is important that the students understand that the terms are new and that they should read carefully to fully understand what the terms mean. The course has been designed so that new terms or concepts are given special attention. They are **defined** and **explained** within the sentence or paragraph. Their meaning is provided at the bottom of the page or in a note in the margin. Also check the beginning of the appendix in each module booklet. Sometimes a special glossary is included. As you supervise, make sure the students know what the new term and concepts are and what they mean.

COURSE MATERIALS

Materials

Materials Supplied	Materials Required	Optional Materials
Courseware Student Support Guide (6) Module Booklets (6) Assignment Booklets (6) **Media** Special audiocassettes providing general teacher guidance	**Textbook** Science Directions 7 **Media** **Other Books** Laboratory Supplies (For a list of laboratory materials, see the introductory pages to each module in the Student Support Guides.)	**Media** VCR (VHS) audiocassette player **Other** Videocassettes used in the course may be available from the Alberta Distance Learning Centre or call your local school authorities.

When you receive your course materials, you should take time to look carefully at what you received. **Take note that your entire course may not be sent at one time.** If you received the wrong course or your course is defective in any way, notify the Student Services Department of the Alberta Distance Learning Centre immediately.

Many of the items that students need in order to complete the laboratory work are everyday items which you may have at home or which can be easily purchased at a grocery store or a hardware store. These items should be collected in advance so that students will not be held up when they start work. In some cases if the materials suggested are not readily available, the learning facilitator may be able to susbstitute suitable materials for the student or make arrangements to use laboratory facilities at a local school so that the activities can be completed successfully. In other cases the student may need to choose a pathway which does not require the materials, or may need to contact the Alberta Distance Learning Centre regarding the purchase of a kit containing some of the more specialized items needed, if this has not yet been done.

Handling the Courseware

Courses may involve audiocassettes and/or videocassettes. Whether the material is loaned or purchased, it is important to take care of these items. Scratches, dirt, grease, extreme temperatures, or magnetic fields such as those in electric motors will damage them.

EVALUATION

There are two kinds of evaluation used in the course: informal and formal. As the learning facilitator you will take part in the informal evaluation.

Informal Evaluation

The course contains two types of activities. In the module booklets there are learning activities that include basic practice and questions that help guide the students to a better understanding. It is important that these activities are corrected as soon as possible so the students get immediate feedback to confirm and clarify their understanding before they go on.

In a classroom these types of activities would be corrected as they are completed by the teacher or by the students. In distance learning courses at the high-school level, the answers for these activities are included in the appendix of each module booklet so that the students can mark the activities themselves. **At the elementary and junior-high level, correcting the activities and discussing the results is one of the most important duties of the learning facilitator.**

When the student has completed an activity, you should skim over it before correcting to be sure the student has spent enough time and effort on the activity.

When checking a student's work, first focus on the work the student has done correctly and then comment on the student's effort. Then, if necessary, spend time clearing up any misunderstandings.

Following are a few suggestions that have proved to be constructive ways of handling errors. First, stop to consider why there are errors. Ask yourself the following questions:

- Is the student repeatedly making the same mistakes or do the errors appear to be random?

- Do the errors appear to be the result of carelessness?

If the student is repeatedly making the same mistakes, you may need to read through that section and explain in your words what the main ideas are.

If the error is random and doesn't have a serious impact, then it is worth ignoring.

If the error appears to be careless, you may need to

- check to see if the student understands the directions
- relate the activity where the errors occur to some meaningful aspect of the student's life
- discuss the information with the student
- have the student slow down
- give the student a rest

Always instruct the student to correct incorrect answers. The module booklet becomes an important reference when doing the assignments, and it is essential that it is accurate.

Remember, it is very important that students not only learn from their corrections, but that they also realize that making mistakes is a normal part of learning.

You may decide to let the student correct some of the activities after you have ensured that the student has spent enough time and effort on the activity. Make sure that you see the activity with its corrections before letting the student go any further in the module booklet.

It is of little value to students if you do their work. How many items are incorrect is not the most important thing, but how the mistakes are handled. Sometimes it is easier when you're guiding the student to put in the answers, but it does not help the student learn the concept. Activities with examples have been included with the student modules to provide guidance for the students.

Formal Evaluation

Formal evaluation is based on the assignments in the assignment booklets and a final test. These are marked by a distance learning teacher. There is an assignment booklet for each module in the course. The assignments are based on the work the student has completed in the module. The student may refer to the module booklet while completing the assignments. The following chart shows the percentage of the final course mark assigned to each module. The final mark is determined by how well the student does on all the modules.

Module 1: Characteristics of Living Things	**10%**
Module 2: Structures and Design	**10%**
Module 3: Force and Motion	**10%**
Module 4: Temperature and Heat Measurement	**10%**
Module 5: Micro-organism and Food Supplies	**10%**
Module 6: Evidence of Erosion	**10%**
Final Test	**40%**

Module Evaluation

Each assignment booklet submitted to the distance learning teacher is evaluated on the basis of the student's demonstrated understanding of the concepts taught in that module, completeness of work, neatness, and legibility. A letter grading is then assigned which follows the scale of percentage or performance equivalencies below.

A	80% – 100%	Outstanding
B	65% – 79%	Good
C	50% – 64%	Satisfactory
D	40% – 49%	Needs Improvement
F	0% – 39%	Unsatisfactory
I	Incomplete	Follow distance learning teacher's directions and return entire module in order to receive a grading.
R	Repeat	

Final Mark

Science, being a core subject in Junior High, requires the writing of a final examination which must be supervised by a responsible adult. (See the *Handbook for Junior High Students* for details.) This supervised test must be written before the student's registration expires. The test will not be returned to the student. In order to receive a passing grade in Science 7, the student must score a "D" or better on the final exam and have an overall standing of "C" or better for the entire course.

The final mark is determined by how well the student does on all the modules and the final test. The test will make up 40% of the student's mark. The other 60% will be based on course work, as evaluated by the student's distance learning teacher. If a student is dissatisfied with a mark, an appeal test may be requested. Such a request must be made by the student within thirty days of receipt of the result statement.

Report Cards

Report cards are mailed twice a year – in October and in February – to all nonschool students under sixteen years of age. The principal or superintendent is also sent a copy of the report card. This card shows the number of modules completed in the course, the average grading per module, and the final mark received for the completed course.

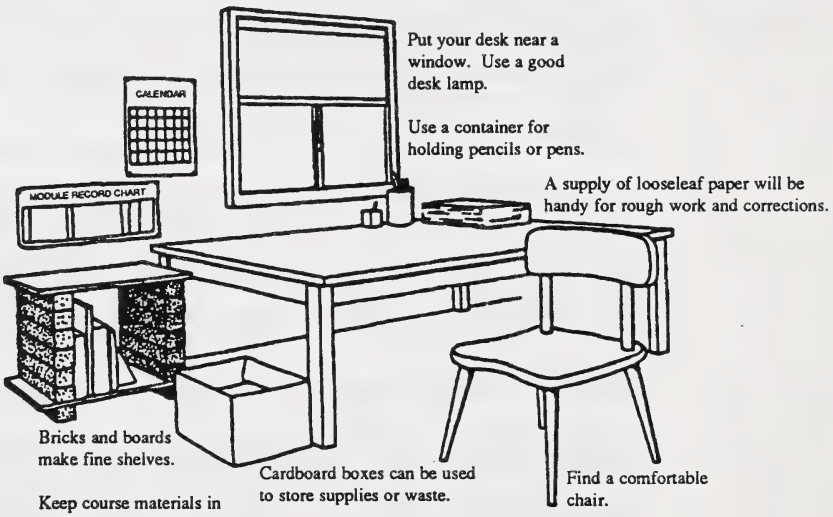
STARTING OUT RIGHT

Proper planning, organization, and good study habits will help your student to succeed in acedemic studies. This section of the guide will give you and your student some idea of how to use time efficiently so that the student can achieve predetermined goals. If you are new to distance learning, both you and the student will probably benefit from the tips on time management and study habits in this section.

Setting Up Shop

Probably one of the best ways to ensure success in distance learning is to establish a study corner. This is a quiet, well-lit area where the student can leave books, papers and supplies. It should be an area where there are no distractions – telephone, radio, television, or people engaged in other activities. Find the best place for studying in your home. A comfortable chair and sufficient work space (table or desk) are essential. All necessary supplies, tools, materials, and books must be gathered. The work area could contain exercise equipment like barbells or even an exercise bike. When your student begins to feel sluggish, encourage a ten minute exercise break.

The following diagram may be helpful for organizing your study area.


Put your desk near a window. Use a good desk lamp.
CALENDAR
Use a container for holding pencils or pens.
MODULE RECORD CHART
A supply of looseleaf paper will be handy for rough work and corrections.
Bricks and boards make fine shelves.
Cardboard boxes can be used to store supplies or waste.
Find a comfortable chair.
Keep course materials in labeled binders or boxes.

Students should keep these things in their work area:

pens	atlas	extra paper	writing portfolio	return envelopes
pencils	eraser	thesaurus	library books	module materials
glue	dictionary	timetable	pencil crayons	ADLC phone number

An efficient student work place will help learning.

Time Management

There are so many demands on our time nowadays that we really must make the effort to organize our work and our activities. This organization or planning is called time management.

With distance learning, it is a necessity that the student plans a schedule. Your duty is to ensure that the student does some advance planning. Check the final plans to see if they are realistic.

Only you and the student knows exactly how much time is available for completing a course. It does not matter too much what time of day the student does course work – this varies with the individual's situation. Distance education is flexible. To decide exactly how much time the student must make for studies, the student must set priorities. Together you must decide exactly when you wish to have the course completed. You must take into account time worked away from home, time needed for chores, and time needed for recreation and relaxation when you make this estimate.

Make a Weekly Plan

Discuss with your student the importance of weekly planning.

People who write for a living always have deadlines to meet. They cannot wait for inspiration. They discipline themselves to sit down and write for a number of hours every day. Whether they like it or not, they stick to a schedule. This determines success.

Work with your student to

- keep track of what your student usually does in a typical week
- plan the studies your student can do in a typical week
- keep a list of what your student must do each day and cross off each study task as it is completed
- find your student's own best time to study
- set deadlines and stick to them
- not dwell on failures and get back on schedule

Have the student fill in a weekly timetable.

Sample Weekly Timetable

Begin when the student usually wakes up.

Write in every hour.

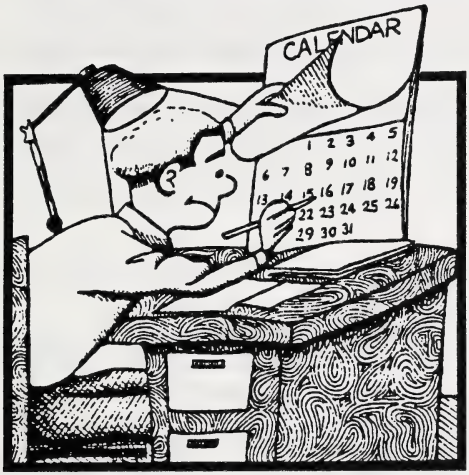
End when the student usually goes to bed.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

The student should keep track of every major activity. It is not wise to plan to use 100% of the student's time. Allow for possible interruptions and jobs taking longer than planned.

Make a Monthly Plan

The next step is planning a monthly schedule with your student. The student should block off the days that are not available for studying.



- Count the days that are available between the start of the course and the desired finishing date.
- Allow time for review.
- Count the number of sections or modules that must be completed within this time.
- Estimate how many days are available to complete each section and each module.
- Make a monthly plan like the one below.

Sample Monthly Timetable

September

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	~~2~~
~~3~~	~~4~~	5	6	7	8	9
10	11	12	~~13~~	14	15	~~16~~
17	18	19	20	21	22	23
~~24~~	25	26	27	~~28~~	~~29~~	30
Total Work Days Available for Study						
Goal :						

Make a Course Plan

When you both have an idea of how much time is available every day, week, and month, look at a plan for completing the course(s) that the student is studying.

Modify these plans as circumstances change. Be flexible, but don't procrastinate.

Our experience has shown that a planned approach to module completion is far better than the hit-and-miss method of completing modules now and then, as you feel like it.

Sample Course Timetable

Course Name _____ Date of Starting _____

Planned Completion Date _____ Actual Completion Date _____

Module	Planned Completion Date	Actual Completion Date	Date Mailed	Date Returned

The student needs determination and perseverance to continue working independently. The student also needs your positive support and interest to keep motivated.

Supervising the Completion of Modules

Try to ensure that the student is following the timetable established as closely as possible and that the target dates for module completions are being met. If, for some reason, the student misses time from studying, the student should spend additional time during the evenings or weekends, so as to complete the course(s) within the desired time limits.

When the student has completed the learning activities, you should allow the student to do the assignment in the assignment booklet. Afterwards you should go over the assignment to ensure the student has spent enough time on the assignment. When the entire assignment booklet is done satisfactorily, submit the assignment.

Basic Study Tips

Planning and good study habits will help the student to succeed in distance learning. Here is a short list of important tips to discuss with the student.

- Work together to make a course plan and weekly timetable, and follow them as closely as you can.
- Remember that mornings are usually better for concentration. Learning styles may vary from student to student.
- Check to see that all necessary materials and supplies are close by before starting work.
- Have the student take relaxation or exercise breaks between study periods.
- Be sure that the student completes all activities carefully and reviews corrections before moving to other assignments.
- Ensure that the student understands and follows directions carefully when completing activities. If the student is unclear about what to do, the student should then start by rereading the directions. If there are still problems, the student should discuss the activity with the learning facilitator. Sometimes reviewing the previous activities is helpful.
- Ensure that written responses are the student's own work.
- Encourge the student to switch subjects or activities before they become stale. If the student is working regularly and truly concentrating, one or two hours on one subject should be enough at one sitting.
- Have the student be sure that writing is neat, legible, and complete.
- Encourage students to discuss their reading and writing with you.

PROCEDURES

How to Send in Your Assignment Booklets

Assignment booklets, along with any other requested materials, should be submitted to the Alberta Distance Learning Centre as soon as possible after the completion of each module in order to obtain speedy, regular evaluation and feedback. The student can proceed with the next module while waiting for the return of the assignment booklet.

Please ensure that your student's file number is on all assignments, tapes, and disks sent to the Alberta Distance Learning Centre.

Report any change of address immediately. If a change is not reported, it is impossible for the school to forward information, letters, or test applications.

Mailing

The student is required to pay the postage on everything sent or returned to the Alberta Distance Learning Centre. To speed up handling, first-class postage is recommended on all assignments submitted.

The student is expected to perform assigned work and to correspond with teachers and administrative staff in an appropriate manner. The Alberta Distance Learning Centre reserves the right to cancel, without refund, the course of any student whose conduct is unbecoming.

Do not enclose letters concerning fees, guidance, additional courses, final tests, or general inquiries with assignments. Send these by separate mail to speed their handling and to avoid their being misplaced.

Dropping Off Your Assignment Booklets

You may drop off assignments at the Edmonton Study Centre or in Barrhead at the Alberta Distance Learning Centre.

Faxing Your Assignments

Be sure the covers of your assignment booklets are filled in correctly with the proper label attached.

Check to see that all response pages have been completed as directed.

Check to see that all faxing boxes located at the bottom of each response page have been clearly filled out.

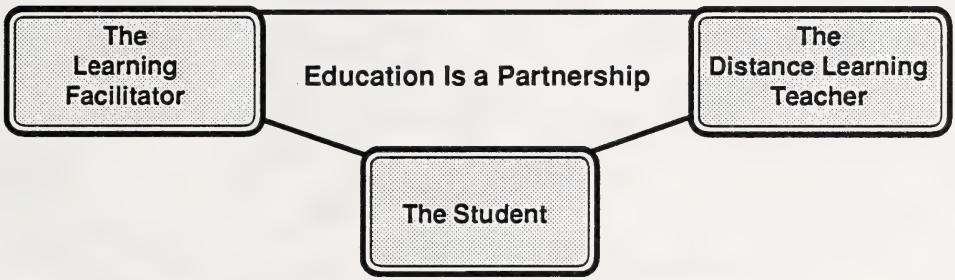
Costs for faxing assignments to the Alberta Distance Learning Centre are the responsibility of the student.

What to Do with Returned Assignment Booklets

Review returned assignments carefully with the student, noting the marks, teacher's corrections, and comments. The teacher may suggest that you make certain choices of activities in future modules to help you practise needed skills. Your teacher may also ask you to complete skill activities which are either included in the course or sent to you by the teacher. Returned assignments should be kept for future review and study.

SUMMARY

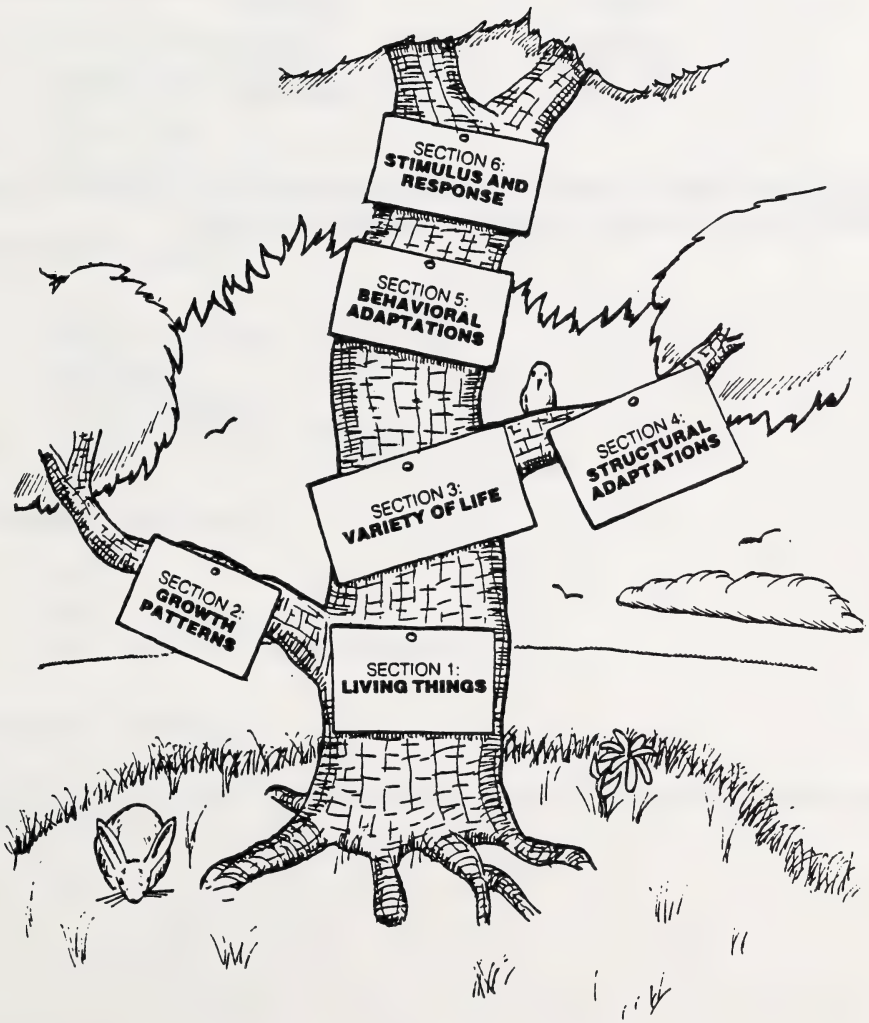
This introductory section of the Student Support Guide has been developed to assist you in your role as learning facilitator. Develop a routine with your student and a good working relationship. Remember, education is a partnership.



Module 1 - Characteristics of Living Things: Overview

The major emphasis of this module is on the nature of science. Opportunities are provided to reinforce and develop science inquiry skills, with particular attention given to observation, organizing and presenting data, and experimental design.

In this module students will investigate features such as growth patterns, how living things respond to changes around them, and how living things are adapted to survive. Like scientists, students will use their observation and interpretation skills to increase their knowledge of living things.



Evaluation

The student's successful completion of all assignments will depend on practice obtained while doing the various activities. Many choices of activities have been provided so that students have some control over their own learning.

The following distribution of marks will determine the student's final mark for this module.

ASSIGNMENT	VALUE
Section 1	15 Marks
Section 2	17 Marks
Section 3	15 Marks
Section 4	15 Marks
Section 5	15 Marks
Section 6	23 Marks
TOTAL	100 Marks

Each module in Science 7 is worth 10% of the student's course mark. The final test, based on the learnings from all six modules, is worth 40% of the total final grading.

Materials Needed for Module 1

Comment:

In order to assist students effectively in their study of this course, it may be helpful to preview Module 1. This will give you an idea as to how the topics are developed; it will also give you an overview of the materials needed in the module. In some cases if the materials suggested are not readily available, the learning facilitator may be able to substitute suitable materials for the student, so that the activities can be completed successfully.

The materials needed for Module 1 and the activities in which they are to be used are as follows:

Section 2: Activity 5

- two small glass jars
- marking pencil
- paper towels
- four bean seeds
- small pie plate or bowl

Section 3: Activity 2

- water
- 500 mL measuring cup
- plastic bucket
- waterproof marking pen
- four identical balloons or freezer bags

Section 3: Extra Help 1

- ruler
- pencil
- sheet of paper (graph paper or plain paper)

Section 3: Enrichment

Note: This "Extra Special Challenge" activity is optional. The materials needed are parts of plants from your local area.

Section 4: Activity 4

Part B

Note: Students may choose Part A, which does not require any materials.

- potato
- paint
- toothpicks
- modelling clay
- glue
- white latex paint
- brush
- tongue depressors
- cotton wool
- tape

Section 6: Enrichment

- clock or watch

The remainder of this Student Support Guide for Module 1 contains the answers and guidance to assist you in correcting the student's work in the Activities. So that the learning facilitator (parent/guardian) does not have to keep referring to the Student Module Booklet, the questions are reprinted from the Student Module Booklet, and the suggested answers are printed in italics. Comments where applicable are made to guide the learning facilitator.

Correct and discuss the answers with the student as the student completes each activity. In this way the student receives immediate feedback to clarify and reinforce basic understanding before moving onto the next Activity.

Towards the end of each section there are Follow-up Activities. Here the activities are separated into two strands: extra help and enrichment. If students had some difficulties understanding the concepts and the activities within the sections, it is recommended that they do the Extra Help. If students had a clear understanding of the concepts and had few difficulties completing the section activities, it is recommended that they do the Enrichment. As the learning facilitator, you should assist the student in choosing the appropriate path in the Follow-up Activities.

The assignments in the Assignment Booklet are to be done under the supervision of a learning facilitator. Ensure that the student always supplies his or her own written responses in the Assignment Booklet. Because these are not tests, the students can refer to the Module Booklet and any additional notes that have been made. Assignments are always marked by a teacher. Wait until all the assignments are completed before submitting the Assignment Booklet.

Section 1: Living Things

By the end of this section students should be able to

- distinguish between living and non-living things
- explain the difference between dead and non-living things
- identify and describe five characteristics of living things

Section 1: Activity 1

List your five senses. Then match each of the previous examples with one of the senses by writing the letter of the example in the space provided.

	SENSE	EXAMPLE
1.	*taste*	*c*
2.	*touch*	*d*
3.	*smell*	*e*
4.	*hearing*	*b*
5.	*sight*	*a*

Section 1: Activity 2

Note: Students are to do either Part A or Part B.

Part A

Study the following picture. Decide if the objects shown in the picture are most likely living, non-living, or dead. Then write the name of the object in the appropriate column in the chart.

Living	Non-Living	Dead
deer *birds (owl and magpie)* *trees* *grass* *bush* *squirrel*	*fire* *frying pan* *tent* *axe head* *fishing rod* *smoke*	*fish* *dead tree* *firewood* *leaves on ground*

Part B

Step 2: Divide your list of things into groups by filling in the following chart. The goal of this activity is to see which person can decide, in the least amount of time, what category each thing on the list fits into.

Living	Non-Living	Dead
Comments: *Objects and living things listed should be appropriate to the heading under which each is listed. In some cases it is possible that an object might be listed under more than one heading; e.g., an object such as a grain elevator may be made of several parts. One part, such as the wood it is made of, may be considered dead. Other parts may contain concrete, stone, or metal which are non-living. Check to see that students are able to give reasons why they placed the object under the heading they choose.*		

Step 3: Compare answers with the other students to see if everyone agrees that the fastest group has correctly classified everything.

Comparisons will vary.

Section 1: Activity 3

List the five important characteristics that all organisms have in common.

- *All organisms grow.*
- *All organisms move.*
- *All organisms reproduce.*
- *All organisms produce or take in food.*
- *All organisms respond to stimuli in their environment.*

Section 1: Activity 4

Classify the things in the following charts as living or non-living. Then give reasons for your decisions. For the context of this activity classify something as living if it currently has all five characteristics, or if it has at one time had all five characteristics of living things. The first two have been done as examples for you.

Thing	Living	Non-Living	Reason
dandelion	x		Dandelions: • grow bigger • move toward light • make seeds which create more dandelions • shrivel in response to weed killer • make their own food
campfire		x	Campfires do not make their own food, and they do not take in food. Fuel must be supplied to the fire.

Thing	Living	Non-Living	Reason
earthworm	x		*Earthworms:* • *grow* • *move through soil* • *reproduce* • *respond to water and presence of food* • *take in food*
maple tree	x		*Maple trees:* • *grow* • *move materials from the soil to the leaves* • *reproduce* • *respond to sunlight* • *make their own food*
diamond		x	*Diamonds:* • *do not move on their own* • *do not need food* • *do not reproduce* • *were formed from coal, which is the remains of living things*
bean seed	x		*Bean seeds:* • *grow to become a bean plant* • *respond to light* • *respond to moisture* • *make their own food*
banana (cut from tree)	x	x	• *If the student considered that the banana is a product of a tree, it would be classified as living.* • *If the student mentioned that banana slices do not grow, do not reproduce, do not make or use food, and do not move on their own, then it could be considered as non-living.*
burning candle		x	*Burning candles:* • *do not grow* • *do not reproduce*

Thing	Living	Non-Living	Reason
leaf on a poplar tree	*x*		*A poplar leaf:* • *grows* • *is capable of producing food* • *is part of a living thing which can reproduce*
sun		*x*	*The sun:* • *does not reproduce* • *does not produce or take in food*
salt crystal		*x*	*Salt crystals:* • *do not produce or take in food* • *do not move on their own*
strand of hair	*x*		• *If the student considers the strand of hair as a product from the organism it came from, then it would be classified as living.*
		x	• *If the student mentions that strands of hair do not move, do not reproduce, and do not take in food, then accept it as being non-living.*

Section 1: Follow-up Activities

Extra Help

1. What are the three categories into which all things can be classified?

   - *living*
   - *non-living*
   - *dead*

2. What is an organism?

   An organism is a living thing. Organisms have the characteristics of living things.

3. What are the five characteristics of all living things?

   - *growth*
   - *responsiveness (to stimuli)*
   - *ability to move*
   - *ability to take in or make food*
   - *ability to reproduce*

4. Classify each of the following as living or non-living. Give a reason for your answer. The first is done for you as an example.

   a. human: *living*

   Humans have all five characteristics of living things.

   b. flower: *living*

   A flower has all five characteristics of living things.

   c. rock: *non-living*

   A rock does not grow or reproduce and is not able to move on its own.

   d. cloud: *non-living*

   A cloud does not use or produce food.

   e. housefly: *living*

   A housefly has all five characteristics of living things.

   f. book: *non-living (or living)*

   A book in its present form does not have the characteristics of living things, but the paper in books is made from a material that was once part of living things.

Enrichment

1. How could you use a microscope to help you decide if something should be classified as non-living or dead?

   You can see cells in living things and in dead things by using a microscope. Non-living things are not made of cells.

2. What characteristics of living things have dead things lost?

   Dead things do not move, do not reproduce, do not grow, and they do not respond to stimuli.

3. What characteristics of living things do dead things still have?

   Dead things have cells.

   Students might also indicate that the appearance remains similar to what it was when it was living.

Note: The student should now complete the assignment for Section 1 in the Module 1 Assignment Booklet.

Section 2: Growth Patterns

By the end of this section students should be able to

- describe patterns of growth of a variety of organisms
- describe and compare different life cycles
- write an hypothesis for a question
- identify variables for an hypothesis

Section 2: Activity 1

1. What does the shape of the line on the graph show you about Peter's growth pattern?

   As Peter grows older, he grows taller. However, the line is not a straight diagonal, and this indicates that Peter's growth rate was not the same each year.

2. Between which birthdays did Peter grow the most?

   Peter grew the most between his twelfth and thirteenth birthday.

3. How many centimetres did Peter grow in the year of his growth spurt?

   He grew twenty-six centimetres in the year of his growth spurt.

4. Did Peter's growth spurt occur at the same time as that of most boys? Or was it earlier or later?

   No, growth rates vary between individuals. The growth spurt happens between the ages of fourteen and sixteen years in many boys. Peter's growth spurt occurred earlier than that of most boys.

5. a. When was Peter's slowest growth period?

      Peter's period of slowest growth was after the age of thirteen years (or between age fourteen and sixteen).

   b. Why do you think Peter's growth was slow during that time?

      Answers will vary.

      Peter's growth was slow during this time because he had already experienced his growth spurt. Or, Peter was probably approaching his mature height.

Section 2: Activity 2

1. The water boatman is an arthropod. This means that it wears its skeleton on the outside of its body like a lobster or a crab. Think of what you would have to do to grow if you were encased in such armour. Suggest a possible reason why the water boatman grows quite a bit in a short period of time and then does not grow at all.

   Suitable answers might include the following ideas:

   The outside covering of the water boatman does not allow growth.
   The covering must fall off before the water boatman can grow.
   Most growth occurs when the outside skeleton (exoskeleton) is shed.

2. How is the growth pattern of the water boatman similar to Peter's growth pattern?

   Both get larger as they grow older.

3. How is the growth pattern of the water boatman different from Peter's growth pattern?

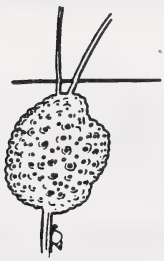
   The water boatman only grows in spurts; Peter's growth is more continuous.

Section 2: Activity 3

1. In the blank space provided, write the letter of each stage to show the correct order of progress from an egg to an adult frog.

First Stage Last Stage

egg mass _f_ _a_ _d_ _e_ _c_ _b_ adult frog



2. You probably used size as one clue to help put the diagrams in the correct order. What other observations helped you?

   Answers will vary. The body parts that are present or the overall size of the various body parts as shown in the diagrams might have helped.

Section 2: Activity 4

1. List three variables that might somehow indicate to a seed that it should start to grow. Write the reason why you think each of these variables may prompt seed growth.

   - variable: *temperature*
     reason: *Plants grow mainly in the spring and summer.*

- variable: *moisture (water)*
  reason: *Plants need water to grow.*

- variable: *light (or darkness)*
  reason: *Some seeds will not grow unless they are covered.*

Section 2: Activity 5

Comments:

If bean seeds are not available, radish seeds or other available seeds may be used instead.

Observations

Day	Jar 1 (Soaked Seeds)	Jar 2 (Unsoaked Seeds)
1		
2	*Answers will vary.* *Observations should show that the soaked seeds germinate earlier than unsoaked seeds.*	
3		
4		
5		

Interpretations

1. a. Do your observations support the hypothesis, or do your observations show that the hypothesis is not correct?

   Answers will vary. Check to see if observations support the hypothesis.

   b. Explain your answer.

   Answers will vary and will need to be evaluated on an individual basis.

2. This testing activity was an example of a controlled experiment. A controlled experiment is designed so that you can change only **one** variable. If all the other variables are kept the same, then you can be reasonably sure that any changes you observe may have been created by the variable you changed. For this experiment, the variable you changed was soaking the bean seeds.

   a. Why was it important to test unsoaked beans as well as the soaked beans?

   Without the unsoaked seeds you would not know if soaking the seeds actually made a difference. They are needed as a control.

   b. Why was it important to place both jars in the same location?

   Only one variable at a time should be changed; all others should be kept constant in a controlled experiment. (Student answers may refer to the idea of a fair test.)

   c. Plants usually grow in soil. What is the advantage of using paper towels to support the seeds in this experiment?

   This provides a way to make the roots visible while the plant is growing.

Section 2: Activity 6

Hypothesis

1. Write a testable hypothesis about how each of the following variables might help a bean seed to grow.

   Various answers may be given. The following are sample answers.

   a. VARIABLE: presence of soil

   HYPOTHESIS: *Seeds placed in soil will grow more quickly than seeds not placed in soil.*

b. VARIABLE: use of sand

HYPOTHESIS: *Placing the seed in sand will not help it grow.*

c. VARIABLE: use of fertilizer

HYPOTHESIS: *Placing some fertilizer with the seed will cause it to grow more quickly.*

d. VARIABLE: presence of salt

HYPOTHESIS: *Placing salt next to the seed will kill the young plant.*

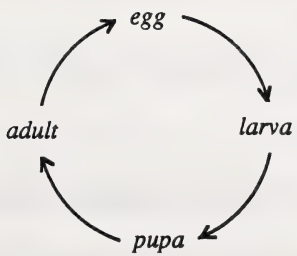
e. VARIABLE: temperature of the soil

HYPOTHESIS: *Placing a seed in a warm place will help it start to grow.*

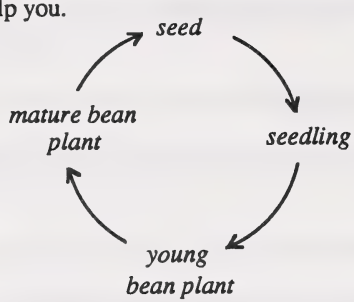
Section 2: Activity 7

Note: Students are to do either question 1 or question 2.

1. Draw the life cycle of the Colorado potato beetle. Use the diagrams on page 20 of the textbook, *Science Directions 7*, to help you.



2. Draw the life cycle of a bean plant. Include the following stages in your model: seed, seedling, young bean plant, and mature bean plant bearing seeds. If necessary, use encyclopedias or other reference books to help you.



Section 2: Follow-up Activities

Extra Help

1. How well do you remember the meanings of words you have been reading? Read the following list of definitions, and think of a word that fits each one. Write the word in the space. If you have any difficulties, look at the word list which follows the Definitions.

DEFINITIONS

a. *organism* a living thing

b. *life cycle* a model that describes the pattern of growth and the process of reproduction of an organism

c. *characteristics* identifying features

d. *species* a group of living things in which all organisms are similar in size and shape

e. *variable* what an experimenter changes when conducting a controlled experiment

f. *hypotheses* a statement that explains why something happens

g. *adult* the last stage of growth of an organism

h. *graph* used to show a pattern for a set of observations

i. *larva* a stage, following the egg stage, in the life cycle of the Colorado potato beetle

j. *reproduction* what links the adult stage of one generation to the egg, or seed, stage of the next generation

Choose the word from the following list that best matches each description. Write the word in the blank space. If you have trouble matching the word with the descriptions, look back through this section to see how the word was used.

WORD LIST

adult	graph	larva	organism	species
characteristics	hypothesis	life cycle	reproduction	variable

2. Kathryn wanted to find out more about how plants grow. Here are the things she did. They are out of order. Arrange the actions in the correct order by writing a number (1 to 6) in the space by each action.

___3___ She collected all the things she needed for the experiment.
___6___ She wrote a report about what she had learned from her observations.
___2___ She wrote a hypothesis on variables that might affect plant growth.
___5___ She recorded all her observations in a chart.
___4___ She carefully observed radishes growing under different conditions.
___1___ She listed several variables that might affect plant growth.

Enrichment

Suppose that you have been given a new puppy. It has large feet, small ears, and a short body. You are trying to decide if the puppy will grow into a large dog.

1. Write a hypothesis about your idea. Remember that your hypothesis should be testable and it should be based on the information that you are given.

Answers will vary.

As previously indicated, all answers must be testable. Example: The dog's body will grow more than its ears and feet.

2. You plan to test your hypothesis by recording the puppy's growth over a period of one year. What measurements should you make each month?

Answers will vary.

Example:
- *length of ears*
- *width of tail*
- *length from nose to hind end*

3. You want to organize the measurements you plan to make. Design a chart to do this.

Answers will vary. Based on the previous example, the chart might look like this.

Age (Months)	*Ear Length (mm)*	*Foot Width (mm)*	*Body Length (mm)*
0			
1			
2			
3			
4			
5			
6			
7 etc.			

Note: The student should now complete the assignment for Section 2 in the Module 1 Assignment Booklet.

Section 3: Variety of Life

By the end of this section students should be able to

- identify and describe similarities and differences between goups of living things
- recognize and describe variation within a group of living things
- identify characteristics that could be used to classify organisms

Section 3: Activity 1

Most of you are familiar with the following four insects: dragonfly, honeybee, housefly and butterfly.

1. a. Which of these four insects do you think will fly the fastest?

Answers will vary.

b. Why did you choose this insect?

Answers should provide a reasonable interpretation based on observations and previous knowledge.

2. a. Which of the four insects do you think will fly the slowest?

Answers will vary.

b. Why did you choose this insect?

Answers should provide a reasonable interpretation based on observations and previous knowledge.

Now that you know what each insect eats, think about which insect needs to fly fast to get food.

3. a. Predict which insect flies the fastest.

The dragonfly flies the fastest.

b. Give a reason for your prediction.

It must catch other insects for food.

4. a. Predict which insect might fly the slowest.

The butterfly flies the slowest.

b. Give a reason for your prediction.

From personal observations, students should realize that a butterfly moves more slowly.

5. How accurate were your predictions for questions 3 and 4? Explain.

Students' answers will vary. The chart in the textbook that students were referred to states that the dragonfly flies the fastest at forty kilometres per hour, and the butterfly flies the slowest at eight kilometres per hour. Check to see how the students' answer in questions 3 and 4 compare to this.

Section 3: Activity 2

Comments:

- The learning facilitator should help the student obtain the necessary materials to do this Activity. (The Materials You Need and the Steps to Follow are stated in the student module.)
- The learning facilitator should supervise the student to check that steps 1 to 8 are properly carried out.

Observations

Name of Person	Volume of Air Moved (mL)
Answers will vary.	

Interpretations

1. How much air can you move in and out of your lungs in a single breath?

   Answers will vary. Answers will be based on observations made.

2. How much variation was there among the four people you measured? (Subtract the smallest measurement from the largest measurement.)

   Answers will vary. Check students' answers with results given in the observation charts.

3. Think about who had the largest lung capacity and who had the smallest lung capacity. Can you think of a possible reason for this? Briefly describe your reason.

   Answers will vary. Factors such as height, weight, chest size, physical activity, and age might be considered here.

4. To test your explanation, you can make a prediction. Based on your explanation, choose a person you think should have a large lung capacity, and using the same method you used before, measure that person's lung capacity. (Remember to use a new balloon or freezer bag.)

   a. Name of Person:

   b. Predicted Lung Capacity:

   c. Measured Lung Capacity:

   Answers will vary. Check to see that steps 4 to 7 of Steps to Follow were properly done to obtain the results here.

Note: If you are in a situation where you are unable to measure the actual lung capacity of the person you selected, proceed to question 5.

5. If your prediction is not close to what you measured, your reasoning may be incorrect. If your prediction is correct, your reason might be correct. However, one prediction and one test is not very much evidence. What could you do to have more confidence in an explanation that seemed correct?

   You could test more people. With more observations, explanations should improve.

Section 3: Activity 3

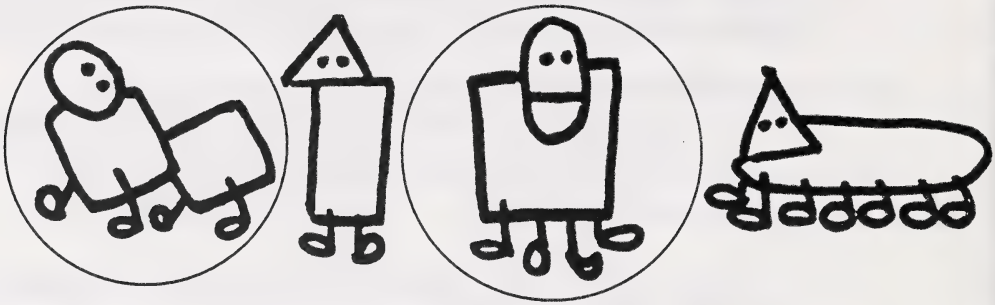
You are going to examine some simple diagrams. some of these belong to an imaginary group called Doles.

1. Try to figure out what characteristics all the Doles have that others do not have.

   All of these are Doles.

   None of these is a Dole.

a. Which of the following figures are Doles? Circle them.



b. What characteristic is used to identify Doles?

All Doles have exactly four legs.

c. Draw two more Doles.

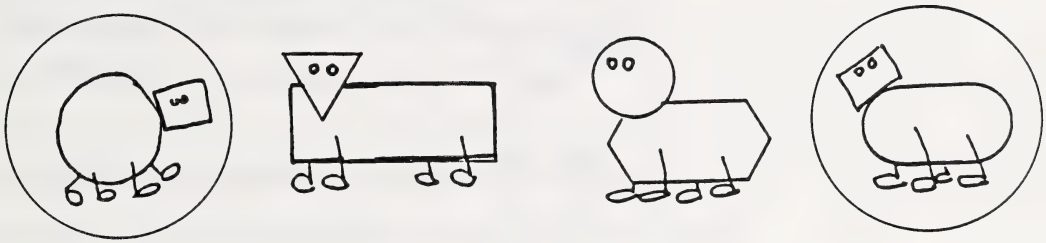
Drawings should be consistent with the identified characteristic.

2. Now try to figure out what characteristics all the Gleeps have that others do not have.

All of these are Gleeps.

None of these is a Gleep.

a. Which of the following figures are Gleeps? Circle them.



b. What characteristic is used to identify Gleeps?

The trunk of all Gleeps consists of one or more rounded body parts.

c. Draw two more Gleeps.

Drawings should be consistent with the identified characteristic.

Comments:

By doing a fun activity involving imaginary creatures, you have practised the skill of identifying similarities and differences. Using imaginary creatures allows simpler classifying. Real organisms are much more complex. Often the criterion for a group cannot be determined by just observing the physical appearance of an organism.

Section 3: Follow-up Activities

Extra Help 1

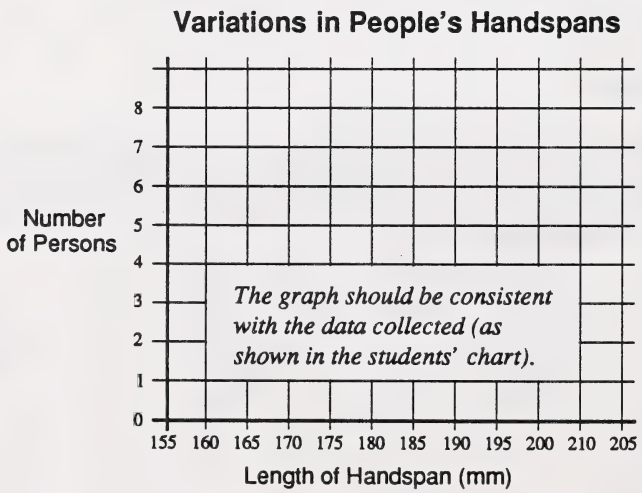
Comments:

This activity is best done with students of approximately the same age, such as classmates or friends. Students should try to measure the handspans of about fifteen people, but if this is not possible in the student's particular situation, this activity can be done with as many people as are available, using family members and/or friends.

Observations

Handspan in Millimetres (mm)	Tally	Number of Persons
155 - 159		
160 - 164		
165 - 169		
170 - 174	*Answers will be based on actual data collected.*	
175 - 179		
180 - 184		
185 - 189		
190 - 194		
195 - 199		
200 - 204		
205 - 210		

Optional: Using the graph paper provided, make a bar graph that shows the data you have collected on handspans. (If you need help on how to construct bar graphs, see Skillbuilder Four on pages 361 to 363 of your textbook, *Science Directions 7*.



Interpretations

1. Which group of handspan sizes did you find most often?

   Answers should be consistent with data gathered.

2. For most human beings, handspan size is probably not important.

   a. Suggest a way of life that would make having small hands an advantage.

      Answers will vary.

      Small hands would be an advantage when the task requires getting into small spaces or working with small equipment.

   b. Suggest a way of life that would make having large hands an advantage.

      Answers will vary.

      Large hands are an advantage when handling large tools or equipment or playing a musical instrument that requires a large reach.

3. Can you predict the size of a person's handspan? If so, what clues do you use in predicting the span?

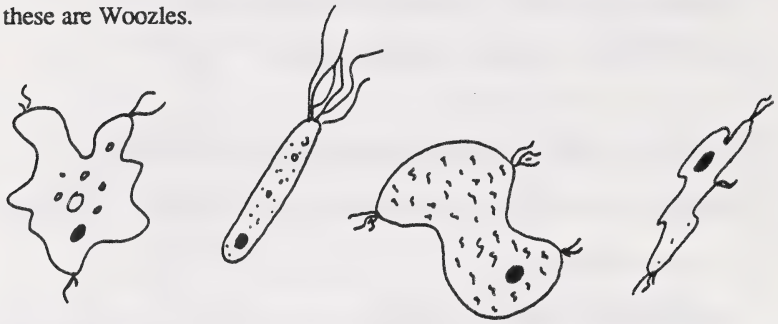
   Answers should show evidence of critical thought.

Extra Help 2

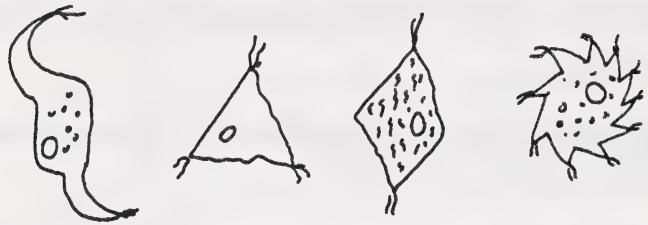
In this activity you will look at more diagrams of imaginary creatures and then put them in groups. This time the creatures are Woozles and Klaks.

1. Woozles have at least one characteristic that other creatures do not have. Try to figure out what this characteristic is.

   All of these are Woozles.



   None of these is a Woozle.



   a. Which of the following figures are Woozles? Circle them.

   b. What characteristic is used to identify Woozles?

      Woozles have a large dark spot.

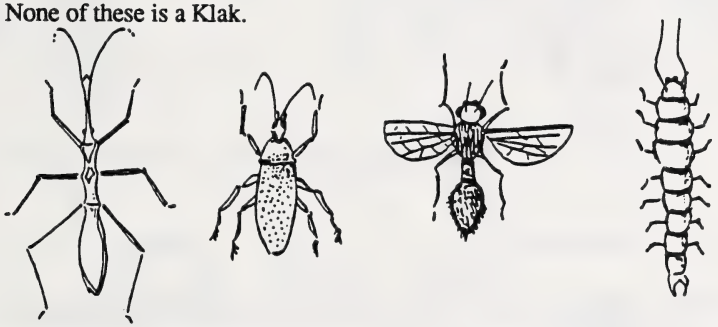
c. Draw two more Woozles.

Drawings should be consistent with the identified characteristic.

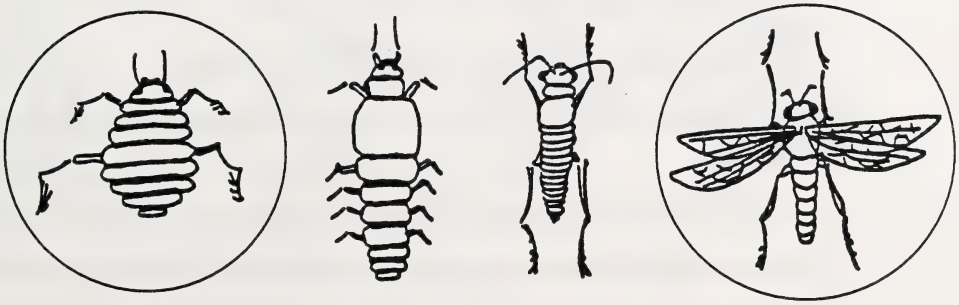
2. Klaks have at least one characteristic that other creatures do not have. Try to figure out what the characteristic is.

All of these are Klaks.

None of these is a Klak.



a. Which of the following figures are Klaks? Circle them.



b. What characteristics are used to identify Klaks?

Klaks have two pairs of legs and eight body segments (in addition to the head).

c. Draw two more Klaks.

Drawings should be consistent with the identified characteristics.

Enrichment 1

In this activity you will examine some drawings of actual plants and identify some characteristics that are different between the two plants shown.

Wormseed Mustard

Chamomile

Examine the drawings of the two plants. See if you can identify four ways in which the two plants are different.

- *The mustard plant has broad leaves; chamomile leaves are very narrow and split into many parts.*
- *The chamomile has a larger flower than the wormseed mustard.*
- *The chamomile flower has large petals at its edges; the mustard flower does not have such large petals.*
- *The mustard plant has a group of erect seed pods around a central stem; the chamomile does not.*
- *The chamomile flower has a rounded half-ball shape at its centre; the mustard flower does not.*

Enrichment 2

In this activity you will examine some diagrams of actual living things and put them in groups. You will then have the opportunity to invent some imaginary plant or animal groups just like the ones you worked with earlier in this section.

1. The first group you will learn about are plants that belong to an actual plant group known as the Mustard family. Try to figure out what characteristics are useful in identifying members of this family.

   All of these are members of the Mustard family.

   None of these is a member of the Mustard family.

a. Which of the following are members of the Mustard family? Circle them.

b. What characteristics are useful to identify members of the Mustard family?

Flowers or seed pods are arranged around a single upright stem, much as bristles on a bottle brush. The seed pods or flowers are turned upwards and are supported by a short stem.

c. Draw an imaginary member of the Mustard family that fits the characteristics you have found.

Drawings should be consistent with the identified characteristics.

d. If you are interested in learning more about plants in the Mustard family, you could look for some examples in a weedy area of your community. Many common weeds are members of this family.

If you find some weeds that you think are members of the Mustard family, collect them and compare them with the pictures. The upper part of the plant should look similar to at least some of the pictures.

For any materials submitted, the characteristics of any plants identified as mustard plants should be consistent with what is indicated previously; i.e., plants should have upright stems; flowers and/or seed pods should be arranged axially around the stem. Flowers have four petals, four sepals, and six stamens. Seed pods generally have a thin partition which separates the pod into two parts. Common examples of this family include: stinkweed, peppergrass, shepherd' s purse, ball mustard, wild radish and wild mustard. Students may wish to consult additional references.

2. The second group you will learn about is a collection of insects that belong to a group known as the Diptera. Try to figure out what characteristics are useful to identify Diptera.

   All of these are Diptera.

   None of these is a member of the Diptera family.

   a. Which of the following are Diptera? Circle them.

b. What characteristics are useful to identify Diptera?

Diptera have six legs and an observable pair of lacy wings.

c. Draw an imaginary member of the Diptera group.

Drawings should be consistent with the identified characteristics.

3. Special Challenge!

See if you can invent an imaginary group of living things and make up an activity like the ones you have just done. To do this, you will need to think about what your new plant or animal would look like. Give your group a name.

The name of my new plant or animal is _____.

Now use this name in each of the following.

a. All of these are. _____. (Fill in the name, and then draw four variations on the idea you have.)

Answers will vary. Answers in each part of this question should fit together in the same way as for previous material. You may wish to begin by viewing the student's answer for "d", and then checking to see if all other parts of the answer are consistent and clear.

b. None of these are _____. (Make four drawings that do not fit the rule or characteristic.)

c. Which of the following are _____? Circle them. (Draw at least one that fits the characteristic and others that do not.)

d. How can you recognize a member of your group? Describe the characteristic that you used to identify it.

_____

_____

_____

4. Extra Special Challenge! (This part is optional.)

   If you would like to try one further challenge on your own, you can do another grouping activity like you just did, but this time use actual plants instead of drawings. To do this, you will need to collect a group of plants from your local area. Then find a characteristic that fits only some of the plants. On your own piece of paper or cardboard, write out your plan and tape on the plants (or parts of the plants) instead of using pictures.

   You will probably want to collect only parts of the plant and only plants that are common wild plants. (Be sure not to collect anything that is rare or uncommon. If in doubt, do not collect the plant.)

   You may want to involve your friends and family in this challenge.

   Answers will vary for this optional activity. Work submitted should be evaluated in a similar way to the previous question.

Note: The student should now complete the assignment for Section 3 in the Module 1 Assignment Booklet.

Section 4: Structural Adaptations

By the end of this section students should be able to

- describe animal and plant adaptations
- explain the value of adaptations

Section 4: Activity 1

For each observation, infer (explain) how the feature observed helps the organism survive. Then describe other observations about the organism that support your inference.

1. OBSERVATION: Rabbits run quickly when alarmed.

   INFERENCE: *The rabbit's speed helps it escape predators.*

   Describe other observations about rabbits that support your inference.

   Rabbits do not have a good way of defending themselves, especially from animals that come from behind.

2. OBSERVATION: Porcupines have quills.

   INFERENCE: *The quills help protect the porcupine from enemies.*

   Describe other observations about porcupines that support your inference.

   Porcupines move slowly and may have difficulty moving away from enemies.

3. OBSERVATION: Ducks have webbed feet.

   INFERENCE: *The duck's webbed feet help it move through water.*

   Describe other observations about ducks that support your inference.

   Ducks are generally found around or in water. They seem to move easily through water.

Section 4: Activity 2

1. Look at the diagrams of the birds shown on page 29 of *Science Directions 7*. Pay particular attention to each beak. Then read the description about the birds (a to l) that follows. In the blank space write the name of the bird that best fits each description.

   a. I fly low along open water, with my bill slightly open, and my lower bill in the water so I can skim small organisms right off the surface.

      Skimmer

   b. I use my strong jaw muscles and strange-looking bill to pry apart the scales on pine cones so I can get at the seeds inside the cones.

      Crossbill

   c. I breed in prairie sloughs. You'll see me there feeding as well. I wade in shallow water, swinging my bill back and forth in the water to gather tiny organisms swimming in the water.

      Avocet

   d. I have a straining device in my mouth. I take in water that contains tiny organisms, filter out the water, and leave the organisms inside my mouth. I tend to turn my head upside down to eat. By the way, I have a long neck and legs, and I'm pink.

      Flamingo

e. You'd confuse me with a bee if you couldn't clearly see that I'm a bird. That's because I often eat the same food as bees – nectar from flowers. I also eat insects, although not very many people know that.

Hummingbird

f. I fly along ready to open my mouth wide as soon as I see an insect – an efficient way of catching insects in flight. Bristles around my beak help funnel the flying insects into my gaping beak.

Nighthawk

g. I'm a diving duck; I have teeth-like structures on my beak to keep the fish I'm attacking from slipping away.

Merganser

h. I'm a wading duck. I don't bother to dive. I just dip from time to time to eat floating vegetation. I often hang around ponds in city parks.

Mallard

i. My beak serves the same purpose as a dog's canine teeth. I can rip and shred meat with it. Because I eat meat, I attack other organisms. I am called a predator.

Falcon

j. I peck on trees to get to the beetle larvae, ants, and termites that live in wood.

Woodpecker

k. I am a close relative of the bird described in *j*. Personally, I prefer sap from trees and the insects that come to drink the sap.

Sapsucker

l. I feed along the shores of ponds and lakes and in prairie sloughs. I'm a large wading bird and have long legs so I can easily wade in water. To get food I stand silently, then suddenly stab at frogs and small fish with my sharp pointed bill.

Great blue heron

Section 4: Activity 3

Note: Students are to do either Part A, Part B, or Part C.

Part A: Plant Diagram and Interpretations

Invent an imaginary plant that is adapted to survive a special condition. You can choose this condition from the following list. Draw a diagram of your imaginary plant, and then describe how you can infer that the plant is adapted to survive the condition indicated.

Invent one of the following plants. Write an *X* in the space in front of your choice.

_____ a plant that can survive being run over by a lawn mower
_____ a plant that can catch insects
_____ a plant that can store water during dry periods
_____ a plant that grazing cattle will not eat
_____ a plant that can withstand high winds
_____ a plant that can live on the surface of ponds or sloughs

Students will choose one of these.

Diagram of Your Plant

Diagrams will vary. The diagram should reasonably illustrate the adaptation that was selected.

Interpretations

Explain how your imaginary plant is adapted to the condition you have chosen. Describe features of the plant that help it survive.

Answers will vary, but they should be appropriate to the adaptation selected. For example, if a student has chosen to show a plant that can survive being run over by a lawn mower, the answers here might include one or more of the following suggestions:

- *The leaves of the plant all lie flat and very close to the ground.*
- *The plant is fast-growing and replaces parts that are cut.*

Part B: Plant Model and Interpretations

Invent an imaginary plant that is adapted to survive a special condition. You can choose this condition from the following list. Make a model of your imaginary plant, then describe how you can infer that the plant is adapted to survive the condition indicated.

Invent one of the following plants. Write an *X* in the space in front of your choice.

_____ a plant that can survive being run over by a lawn mower
_____ a plant that can catch insects
_____ a plant that can store water during dry periods
_____ a plant that grazing cattle will not eat
_____ a plant that can withstand high winds
_____ a plant that can live on the surface of ponds or sloughs

Students will choose one of these.

Model of Your Plant

Make a model of your imaginary plant. Use anything you want to help show your plant's structural adaptations. For example, you could use cellophane, modelling clay, coloured paper, wire, or ribbon.

Models will vary. The model should reasonably illustrate the adaptations that were selected.

Interpretations

Explain how your imaginary plant is adapted to the condition you have chosen. Describe features of the plant that help it survive.

Answers will vary, but they should be appropriate to the adaptation selected. For example, if a student has chosen to show a plant that can survive being run over by a lawn mower, the answers here might include one or more of the following suggestions:

- *The leaves of the plant all lie flat and very close to the ground.*
- *The plant is fast-growing and replaces parts that are cut.*

Part C: Explaining Existing Plant Diagrams

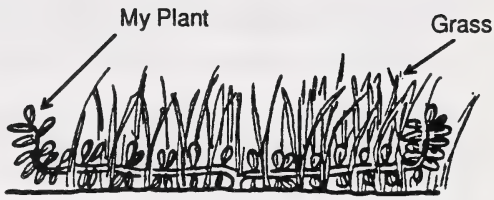
Four grade 7 students drew diagrams of imaginary plants that were adapted to survive some special conditions. Examine each diagram, then infer which condition the plant could survive. Write the number of the condition in the space provided for each plant, then describe why you inferred that it was adapted to survive the condition you chose.

Conditions:

1. a plant that can survive being run over by a lawn mower
2. a plant that can catch insects
3. a plant that can store water during dry periods
4. a plant that grazing cattle will not eat
5. a plant that can withstand high winds
6. a plant that can live on the surface of ponds or sloughs

Gurpreet's Diagram

Which condition do you think Gurpreet's plant can survive? ___1___

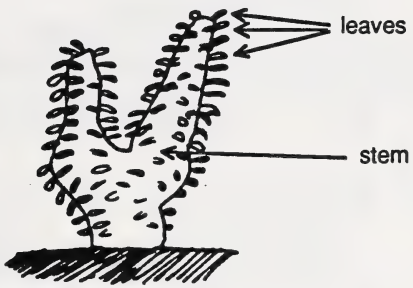


Explain how Gurpreet's imaginary plant is adapted to the condition you have chosen.

The leaves of the plant are very close to the ground. The plant is fast-growing and replaces leaves if they are cut.

Jennifer's Diagram

Which condition do you think Jennifer's plant can survive? ___3___

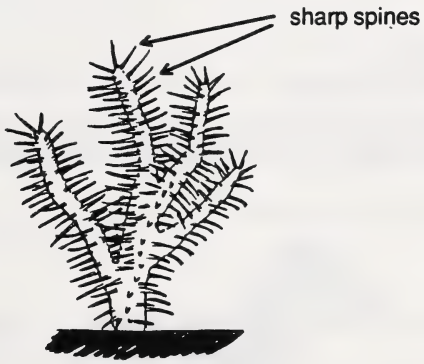


Explain how Jennifer's imaginary plant is adapted to the condition you have chosen.

Water could be stored in the thick stems. By having small leaves, the plant does not dry out quickly.

Marcel's Diagram

Which condition do you think Marcel's plant can survive? ___4___

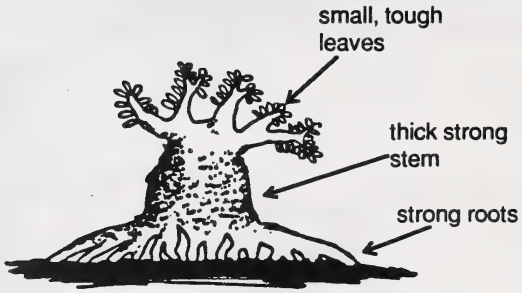


Explain how Marcel's imaginary plant is adapted to the condition you have chosen.

The sharpness of the spines make it undesirable as cattle food. The plant may also cause irritation to the animal if it rubs up against it.

Huynh's Diagram

Which condition do you think Huynh's plant can survive? *3 or 5*



Explain how Huynh's imaginary plant is adapted to the condition you have chosen.

If 3 is chosen: Water could be stored in the thick stems. By having small leaves, the plant does not dry out quickly.

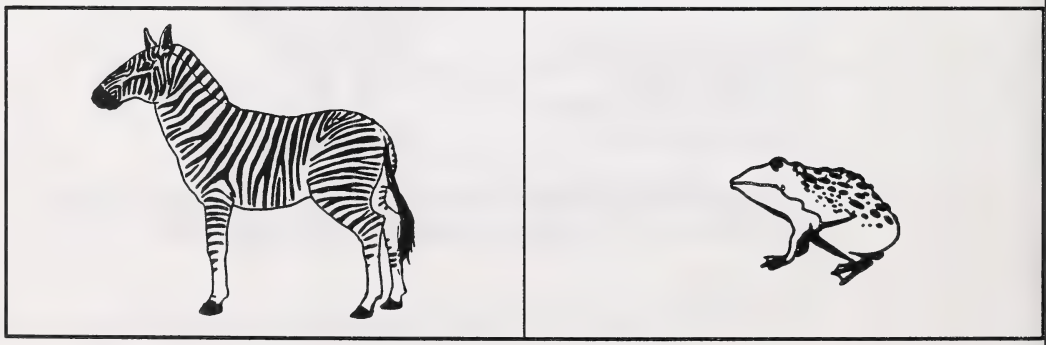
If 5 is chosen: The thick roots hold the plant in place during high winds.

Section 4: Activity 4

Note: Students are to do either Part A or Part B.

Part A

Draw an environment for the following two animals. Then colour each picture. Try to show how each animal is adapted to its environment by camouflage.



The drawings should illustrate the camouflaging of an animal through the use of colour and the use of designs that blend in with the surroundings.

Part B

Comments:

- The learning facilitator should help the student obtain the necessary materials to do this Activity. (The Materials You Need and the Steps to Follow are stated in the student module.) If some of the materials listed are not available, students can use their ingenuity to substitute suitable available materials to achieve the same objectives.

- The learning facilitator should check to see that steps 1 to 6 were properly done.

Interpretations

1. Was your animal easily found? Why or why not?

   Answers will vary, but they should show evidence of critical thinking about the effectiveness of the camouflage used.

2. How might you improve your camouflage?

   Answers will vary, but they should show evidence of critical and creative thought.

Section 4: Follow-up Activities

Extra Help

Describe three features of a fish that help it move through the water. Write each answer in a sentence.

- *The shape of a fish is usually streamlined so that it can pass through water easily.*

- *Fish have flat tails that help move the fish quickly.*

- *Fish have fins on the sides (pectoral fins), on the back (dorsal fin), and on the bottom (ventral fin), which helps the fish move in the direction it chooses to go.*

Enrichment

Read pages 22 and 23 of *Science Directions 7*. Look at the diagrams of seeds of some common plants shown on page 23.

Think about how these seeds might move from one place to another. Then choose one of the seeds and examine it closely. Based on your observations, write an inference about how you think the seed might move. Write one observation about the seed that supports your inference. Do this for four different seeds.

Answers will vary. Following are examples of answers that might be given.

- Seed Chosen: *Examples: milkweed or dandelion*

  Inference: *Milkweed can be carried in the wind.*

  Supporting Observation: *The milkweed seed has many fine hairs that are easily carried by the wind.*

- Seed Chosen: *Examples: beggars-tick or cocklebur*

  Inference: *The seed could be carried on animal fur or on clothing.*

  Supporting Observation: *The seed has many hooks or spines that might stick to fur or clothing.*

- Seed Chosen: *Examples: acorn or snowberry*

  Inference: *The seed might be carried by animals that use the seed for food.*

  Supporting Observation: *A large part of the seed is made up of stored food.*

- Seed Chosen: Example: *maple*

  Inference: *As the seed falls from the tree, the wind may carry it.*

  Supporting Observation: *The large flat surface of the seed may help it be carried in the wind when the seed falls.*

Note: The student should now complete the assignment for Section 4 in the Module 1 Assignment Booklet.

Section 5: Behavioural Adaptations

By the end of this section students should be able to identify examples of behavioural adaptations.

Section 5: Activity 1

1. Name three species of birds that fly south for the winter.

   Answers will vary.

   Examples: hawks, mallards, robins, finches

2. Give two hypotheses about why you think they fly south. Each hypothesis should be stated in a sentence.

   Answers will vary. Example answers are given.

   - *There is not much food available in northern areas in the winter, so birds may fly south to find food.*
   - *The climate in the north is very cold in the winter so birds may fly south to keep from freezing.*

Section 5: Activity 2

Imagine that you are a biologist studying the behaviour of animals during the winter. Describe what could happen to the following animals if they did not migrate for the winter. Remember that migration is explained as a behavioural adaptation which helps the organism survive.

Blue Whale: *In winter the ice pack will cover the surface of the water. If whales do not migrate, they will not be able to reach the surface and will not be able to breath. They will die as a result.*

Yellow-rumped Warbler: *If the warblers do not migrate they will starve. All the moving insects which the warbler eats are not available during the winter.*

Section 5: Activity 3

1. Why do you think John made the predictions that he did?

   The predictions are likely based on his knowledge about hibernation. Since a hibernating animal does not need much energy, its body processes would be slowed down.

2. Use the graph to find the following information. What is the

   a. heart rate of an active squirrel? *160 beats per minute*

   b. heart rate of a hibernating squirrel? *about 25-30 beats per minute*

   c. body temperature of an active squirrel? *about 35 °C*

   d. body temperature of a hibernating squirrel? *about 2 °C*

3. How does the graph support his two predictions?

   The graphs show a sudden drop in heart rate and body temperature in October. During the winter months the heart rate remained slow and the body temperature remained low. In spring (April) the body temperature and heart rate increased suddenly.

Section 5: Follow-up Activities

Extra Help

1. Describe a human behaviour that helps keep body temperature at 37°C when the outside temperature is cold.

   Humans keep their body temperature at 37°C by shivering and keeping active when they are cold. Other suitable answers include: putting on warm clothes, exercising, turning up the room temperature, and drinking hot drinks.

2. Describe a human behaviour that helps keep body temperature at 37°C when the outside temperature is hot.

   Humans keep their body temperature at 37°C by sweating when they are too hot. Other suitable answers include: cool showers, cold drinks, wearing fewer clothes, and using a fan to evaporate moisture on skin.

Enrichment

Think of some cold-blooded animals. Choose two and then describe behavioural adaptations of each that helps them survive very cold or very hot weather.

1. Name of Animal: *Example: frog*

   Behavioural Adaptation: *Some frogs bury themselves in ponds all through the winter and emerge in the spring.*

2. Name of Animal: *Example: ants*

   Behavioural Adaptation: *Ant nests often have sections that are deep underground. These sections do not freeze during the winter months.*

Answers will vary. Other examples may include animals such as dragonflies, turtles, snakes, and houseflies. These lie in the sun in cool weather to raise their body temperture so they can become active enough to hunt for food. If daytime temperatures become too hot, cold-blooded animals such as snakes and turtles may avoid the sun by moving into burrows in cooler earth, or seeking water or shade to keep cool.

Note: The student should now complete the assignment for Section 5 in the Module 1 Assignment Booklet.

Section 6: Stimulus and Response

By the end of this section students should be able to

- identify examples of stimulus-response patterns in the behaviour of organisms
- recognize and describe responses to specific environmental conditions
- distinguish between learned, instinctive, and involuntary responses

Section 6: Activity 1

1. Moths are flying around a campfire. Some fly into the fire and some fly away from the fire.

   STIMULUS: light from the campfire

   Possible RESPONSES:

   - moths fly into the fire

   or

   - moths fly away from the fire

   Possible RESULTS:

   - moths survive

   or

   - moths die (because they burn in the fire)

Use the stimulus, possible responses, and likely results to make two linkages.

a. STIMULUS	→	RESPONSE	→	RESULT
light from campfire		*moths fly towards*		*moths are burned*
		light		*in fire*

b. STIMULUS	→	RESPONSE	→	RESULT
light from campfire		*moths fly away*		*moths are not*
		from fire		*harmed by fire*

2. A houseplant is placed on a ledge near a window. The plant can grow toward the window or away from the window. The window lets in sunlight. The plant needs sunlight to make food for itself.

   Fill in the following blanks.

   STIMULUS: *sunlight coming through a window*

   Possible RESPONSES:

   - *The plant grows toward the sunlight (window).*
   - *The plant grows away from the sunlight (window).*
   - *The plant does not respond to the light.*

   Possible RESULTS:

   - plant survives

   or

   - plant dies (because it is not able to make food)

   Use the stimulus, possible responses, and likely results to make two linkages.

a. STIMULUS	→	RESPONSE	→	RESULT
sunlight from one		*plant grows toward*		*plant growth*
side		*light source*		*is improved*

b. STIMULUS	→	RESPONSE	→	RESULT
sunlight from one side		*plant grows away from light source*		*plant growth is lessened (plant eventually dies)*

Section 6: Activity 2

Comments:

- The learning facilitator should check to see that the student is following the proper procedure to measure their pulse rate. (This is outlined in the first step of the Procedure on page 42 of the textbook, *Science Directions 7*.)
- The learning facilitator should supervise the student to check that steps 1 to 6 for this Activity are properly carried out.
- If for any medical reason the student should not exercise or run on the spot, then someone else can do steps 1 to 6 while the student acts as the recorder to record the results.

Observation Chart

Stimulus	Trial One beats per minute	Trial Two beats per minute	Average beats per minute
sitting still			*60 - 90*
thinking			*60 - 90*
exercise			*90 - 150*

typical range

Interpretations

1. What was your resting pulse rate after sitting still for five minutes?

   Answers will vary.

2. Were you able to change your pulse rate by thinking about it?

   "No" is the normal response.

3. How did exercise change your pulse rate?

   Exercise caused the pulse rate to increase.

4. Is pulse rate most likely a learned response, an instinctive response, or an involuntary response?

   Pulse rates are an involuntary response.

5. Explain how your observations support your answer to question 4.

   I was unable to change my pulse rate. Pulse rate is changed automatically in response to the body's needs.

Section 6: Activity 3

Comment:

- The learning facilitator should supervise the student to check that steps 1 to 5 are properly carried out.

Observation Chart

Stimulus	Trial One times per minute	Trial Two times per minute	Average times per minute
sitting still			*8 - 15*
thinking			*8 - 15*
exercise			*20 - 40*

typical range

Interpretations

1. Explain how your observations support the idea that sometimes you can control your breathing rate, while other times your breathing rate is involuntary.

   Your breathing rate can change automatically, but it can also be changed deliberately.

Section 6: Activity 4

1. In (a) on page 54 of the textbook, why do you think the wasp did not fly away immediately when she came out of her nest?

   The wasp needed to familiarize itself with landmarks around the nesting hole.

2. What test was the researcher making in (b) on page 54?

   The researcher was trying to determine if the wasp would return to the circle of pine cones rather than to its nest. If so, there would be evidence that the wasp had memorized the landmarks.

3. Why was the test repeated several times?

   It was repeated in order to ensure that the findings were accurate.

4. What was being tested in the set of experiments described under (c) on page 54?

   The researcher was trying to find out whether the wasp used the pine cones or the shape in which they were arranged (circular shape) to find the nest.

5. Circle the hypothesis that the observations support.

   Hypothesis 1: Digger wasps memorize the shape of the landmark.

   Hypothesis 2: Digger wasps memorize the kind of material the landmark is made of.

   What observations from the experiment support your answer?

   The wasps returned to the circle to find their nests. They did not respond to objects arranged in a triangle.

Section 6: Activity 5

1. Which stimulus do you think causes one male stickleback fish to attack another?

   The red colour of the belly cause the male stickleback fish to attack.

2. Why might a male stickleback try to keep other males away from its mate?

   The male wants to keep his mate for himself.

3. Fill in the spaces to show a stimulus-response model for male stickleback fish during mating season.

STIMULUS	→	RESPONSE	→	RESULT
sight of red belly		*chase the fish*		*the fish keeps its*
		away		*mate to itself*

Section 6: Activity 6

1. State one behaviour of songbirds that could be classified as a learned response.

   The songs that songbirds, such as robins and meadowlarks, sing must be learned.

2. State evidence which supports your answer.

   If a young bird is isolated from others of its kind and does not hear its species' song early in life, it will not be able to communicate effectively.

Section 6: Follow-up Activities

Extra Help

1. Match up the most likely response for each stimulus by writing the letter of the response in the space provided.

STIMULUS	RESPONSE
___c___ it is snowing outside	a. wake up in the morning
___f___ a bright light flashes on	b. pull your hand back quickly
___a___ the alarm clock rings	c. put on a hat and mitts
___e___ the garbage begins to smell	d. open the door
___b___ you touch a hot object	e. take the garbage outside
___d___ the doorbell rings	f. close your eyes suddenly

2. White-tailed deer can often be found grazing on grass. If a hunter approaches the deer with the wind blowing from the hunter towards the deer, the deer can often sense the hunter's approach.

   Fill in the following spaces.

   a. STIMULUS: *A hunter approaches the deer.*

   b. Possible RESPONSES:

      - *The deer ignores the hunter approaching.*
      - *The deer moves away to a remote area.*

   c. Possible RESULTS:

      - *The deer is shot.*
      - *The deer grazes safely.*

   Use the stimulus, possible responses, and possible results to make two linkages.

d. STIMULUS	→	RESPONSE	→	RESULT
A hunter approaches.		*The deer ignores*		*The deer is shot.*
		the hunter.		
e. STIMULUS	→	RESPONSE	→	RESULT
A hunter approaches.		*The deer moves away*		*The deer grazes*
		to a remote area .		*safely.*

Enrichment

1. STIMULUS: *The boy touches a hot stove.*

2. Possible RESPONSES:

   - *The boy pulls his hand away.*
   - *The boy leaves his hand on the stove.*

3. Possible RESULTS:

   - *The boy's hand is not seriously harmed.*
   - *The boy's hand is burned badly.*

4. Use the stimulus, possible responses, and possible results to make two linkages.

a. STIMULUS	→	RESPONSE	→	RESULT
heat of stove		*boy pulls hand*		*hand is not*
		away		*seriously harmed*

b. STIMULUS	→	RESPONSE	→	RESULT
heat of stove		*boy leaves hand*		*hand is*
		on stove		*burned badly*

Comment:

If the student experienced any difficulty with this Enrichment, the student should review the Extra Help.

5. Describe the stimulus and the response which causes you to keep breathing.

   a. Stimulus: *Changes in the amounts of carbon dioxide in your system are detected by receptors in your body.*

   b. Response: *Certain muscles in your chest will contract to force carbon dioxide out of your lungs when receptors sense that there is too much carbon dioxide in your body.*

Note: 1. The student should now complete the assignment for Section 6 in the Module 1 Assignment Booklet.

2. Check to see that all assignments have been completed and that all written work is done neatly in blue or black ink. Diagrams may be left in pencil.

3. The completed Assignment Booklet should now be submitted to the Alberta Distance Learning Centre for correction. The student can proceed with the next module while waiting for the return of the Assignment Booklet.

Learning Facilitator: Please help your student complete this form and return it with the first assignment booklet.

Student Questionnaire for Science 7

Name _____ File Number _____

Address _____ Telephone Number _____

_____ Age _____

_____ Date _____

1. Provide details of the last Science course you completed successfully.

   Course: _____ Year Completed: _____

   School: _____ Final Mark: _____

2. What school are you attending now (if any)? _____

3. Are you working on this course ❑ at home? ❑ at school? ❑ at both?

4. Are there other students in your school/district taking distance learning courses? ❑ Yes ❑ No

5. Are there other students in your school taking this course through distance education?
   ❑ Yes ❑ No

6. What other distance learning courses are you taking? _____

   _____

   _____

7. Have you taken a distance learning course before? ❑ Yes ❑ No If yes, when? _____

8. Why are you taking a course through distance learning now? _____

   _____

9. Mention any special factors (handicaps, illness, family problems, etc.) which may influence your progress in your studies.

   _____

   _____

In order to get to know you better, we would like you to tell us a bit about yourself. Write a paragraph or two telling us about yourself, your plans for the future, or anything else about yourself that you think would interest us.

Please attach a recent photo of yourself if possible.

Name of Student _____ Student I.D. # _____

Name of School _____ Date _____

N.L.C. - B.N.C.
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Science 7

St. Support Guide
Module 1

L.R.D.C.
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